

TECHNICAL MEMORANDUM

TRAFFIC IMPACT STUDY

OF THE

H-1 FREEWAY ALIGNMENT

Honolulu Area Rapid Transit System  
Environmental Impact Statement & Refine Engineering Phase



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Prepared for

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by

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A. INTRODUCTION & BACKGROUND

The PEEP I study<sup>1/</sup> identified the rapid transit alignment through Kaimuki to be on the mauka edge of the H-1 Freeway by acquiring private properties to create an exclusive transit right-of-way.

Due to the fact that this concept would involve over 100 residential dislocations and associated environmental impacts, the City Department of Transportation Services (DTS) explored the concept of utilizing 2 lanes of the H-1 Freeway for rapid transit<sup>2/</sup>. Under this concept, the 2 existing 12-ft. lanes would be taken for the exclusive use by the rapid transit system which would leave only the remaining lanes available for auto use. In the six-lane portion of the freeway, only 2 lanes in each direction would remain and in the 8-lane portion, 3 lanes in each direction would remain. This concept was pursued based on the premise that existing facilities should be used for increasing the "people-carrying" capacity of the facility, which rapid transit would do with its large passenger carrying-capacity with its tracked guideway.

The above concept, upon close examination of its adverse effects on automobile traffic, indicated that the elimination of 2 heavy lanes may be more detrimental than at first anticipated. Thus, this concept was reconsidered in favor of retaining the existing laneage.

This report documents the supplemental studies conducted for co-locating the rapid transit facility within the existing H-1 Freeway right-of-way to conform to basic technical requirements of highway design.

B. DESIGN PARAMETERS FOR HIGHWAY MODIFICATION

In collaboration with the State Department of Transportation (DOT) representatives, design parameters were defined for accommodating the rapid transit facility within the existing H-1 Freeway right-of-way. The following basis of design was established for conducting the study.

1. Maintain existing number of lanes by widening the roadway within the existing right-of-way
2. Provide 11-ft. lanes
3. Provide 4-ft. inside shoulder width
4. Provide 10-ft. outside shoulder width except adjacent to auxiliary lanes where 6-ft. shoulders will be provided and also where 6-ft. shoulders currently exist they will be maintained.

C. HIGHWAY MODIFICATION PLAN

Highway modification plans to accommodate the rapid transit facility in the center of the roadway were developed including typical sections of the proposed roadway and modifications required.

The key features of the modification work are demolition and rebuilding of overpass structures, demolition of existing retaining walls, required excavation of existing banks to accommodate the widening, rebuilding of retaining walls, widening of the Waialae-Kahala viaduct, and reconstruction of roadway pavement and ancillary improvements.

The widening of the highway will affect some of the on-and-off-ramps which entails some modifications to the grades. Where ramps are raised or lowered, some retaining walls will be required as well as adjusting existing driveways to private properties.

With some of the houses located very close to the freeway right-of-way line, extreme care must be exercised in excavating the rock, especially where the roadway is in deep excavation with high banks. Rock wall facings will be reconstructed to retain the same roadway character as currently exists.

#### D. HIGHWAY TRAFFIC IMPACT

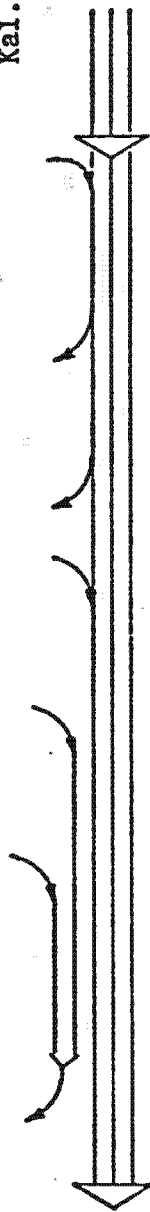
Although no freeway lanes are eliminated with the proposed plan, the net effect of the modification of the freeway section is a reduction in its capacity by some 5%. To assess the impact that the proposed plan will have on the H-1 Freeway and its users, not only should the affected segment be studied, but its relationship to the remainder of the highway system should also be considered. Table I on the following page shows the westbound roadway and ramp capacities for both the existing and proposed conditions for that segment of the highway system between Kalanianaʻole Highway at Ainakoa Avenue to the Kapiolani Interchange. Also shown in the table is the projected A.M. peak hour volumes for 1995 based on a "free" assignment of the auto trips on an unconstrained street and highway network. It can be seen that both ends of the affected segment of H-1 Freeway have capacity constraints. On the eastern end, Kalanianaʻole Highway with a capacity to accommodate a maximum of 4,500 vehicles per hour (vph) joins the freeway which has a maximum capacity of 5,800 vph at the Ainakoa Avenue intersection. On the western end, the freeway capacity reduces from 9,670 vph to 5,800 vph downstream of the Kapiolani Interchange.



TABLE I

CAPACITIES & DEMAND VOLUMES

Kapiolani      5th      11th      Waialae      Kilauea      Ainakoa      Kal. Hwy.

CAPACITY:\*

• EXISTING  
- ROADWAY  
- RAMP

• PROPOSED  
- ROADWAY  
- RAMP

DEMAND \*\*

• ACTUAL  
- ROADWAY  
- RAMP

5,800	9,670	7,730	5,800	5,800	5,800	5,800	4,500
1,200	1,000	1,000	1,200	1,000	1,200	1,200	--
5,800	9,190	7,340	5,510	5,510	5,510	5,510	4,500
1,200	1,000	1,000	1,200	1,000	1,200	1,200	--
7,510	9,830	8,640	6,120	4,120	4,680	5,290	4,680
2,320	1,190	2,520	2,000	560	610	610	610

\* Capacity based on level of Service E.

\*\* Projected 1995 A.M., peak hour, peak direction volumes based on a "free" assignment of auto trips on an unconstrained street and highway network.

It can also be seen from the table that where the demand on the H-1 Freeway exceeds the capacity of the proposed condition, the existing capacity is also exceeded. Also, these overcapacity situations occur in sections where ramp volumes greatly exceed their capacities. The capacity of these ramps are governed by the access conditions onto the ramp rather than the conditions at the entrance of the ramp to the freeway. Thus, unless the access conditions to the ramps can be improved, the projected demand volumes on the freeway will not be attainable and the actual volumes should be within the capacity under the proposed conditions.

There will be motorists who will not be able to utilize the freeway, even if the existing conditions were maintained, and would utilize other facilities in the area. Therefore, a screenline analysis was conducted to determine if adequate capacities were available on street facilities adjacent to the H-1 Freeway to accommodate those motorists who are unable to use the freeway. The location of these screenlines are shown in the Exhibit A on the following page and the screenline vehicular volumes and roadway capacities for both the existing and proposed conditions listed in Table II. This screenline analysis indicated that there is sufficient capacity under both the existing and proposed conditions to accommodate

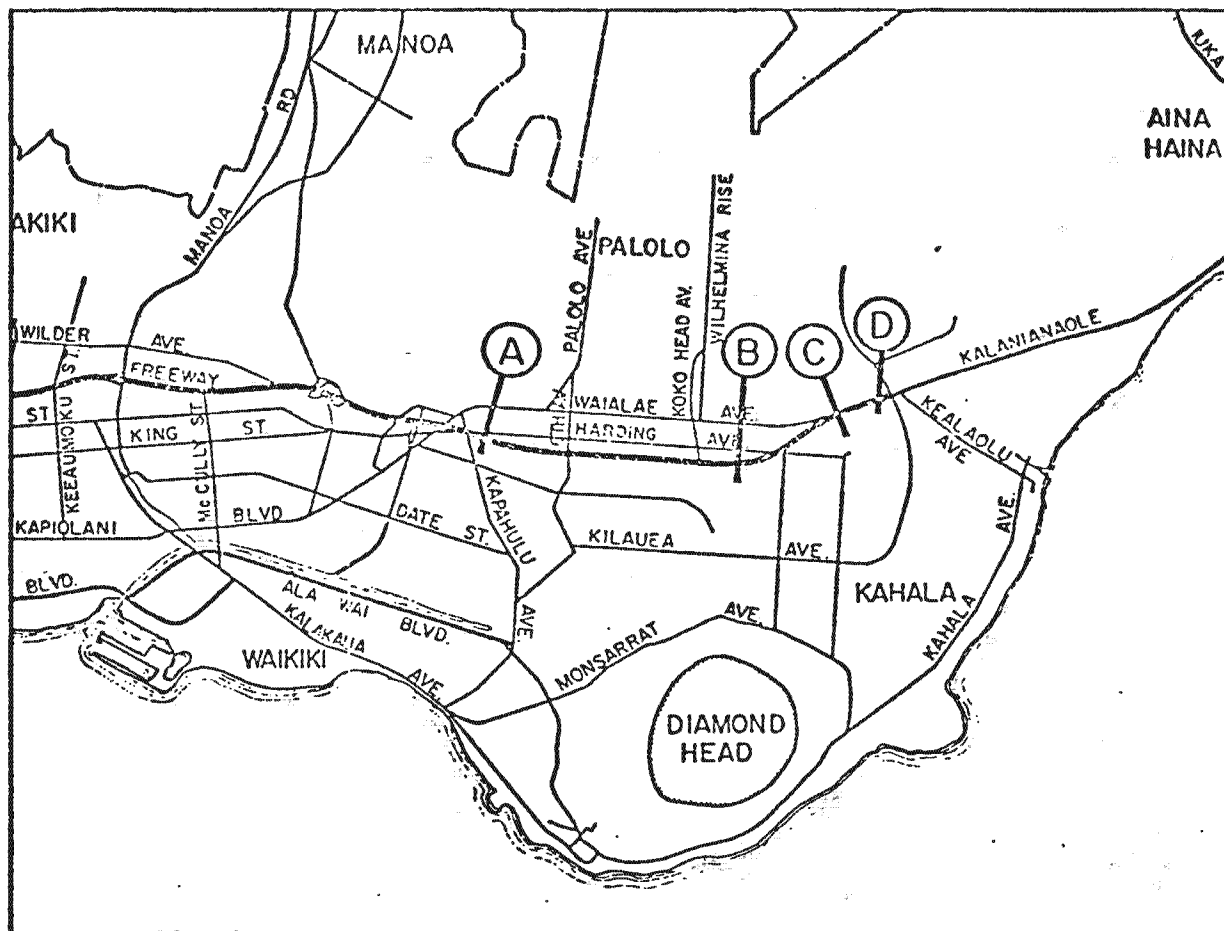


EXHIBIT A LOCATION OF SCREENLINES ALONG THE H-1 (LUNALILO) FREEWAY CORRIDOR IN THE KAIMUKI/KAHALA SEGMENT

TABLE II

SCREENLINE VEHICULAR CAPACITIES AND VOLUMES\*

Screenline	Projected Volume	Existing Capacity**	V/C	Proposed Capacity**	V/C
A	10,850	12,360	0.88	11,880	0.91
B	7,400	8,490	0.87	8,200	0.90
C	7,130	8,600	0.83	8,310	0.86
D	5,040	8,600	0.59	8,310	0.61

\* A.M. Peak Hour, Peak Direction

\*\* Maximum Capacity

all auto traffic demands along the H-1 Freeway corridor but at a slightly lower level of service with the proposed modification of the freeway section.

Besides the slight reduction in the level of service provided, another potential effect of the proposed plan of reducing freeway lane and shoulder widths is safety. Applicable statistical data available to determine the actual effect of a reduction in lane or shoulder width was found to be quite small and insufficient to develop reliable correlation between different widths. However, based on these limited data sources, only a general statement can be made that increase in lane width could improve safety.

## REFERENCE

1. Honolulu Rapid Transit System - Final Report, December 1972
2. Feasibility Study of the Lunalilo Freeway Route for Fixed Guideway System - Interim Report, March 1974



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